

IHRA Biomechanics meeting of March 5-6, 2002 Final Minutes

Attendance:

Rolf Eppinger
Dainius Dalmotas
Jac Wismans
Dominique Cesari
Minoru Sakurai
Kashiro Ono
Risa Scherer
Suzanne Tylko
Steve Rouhana
Anette Irwin
Shashi Kupea

Chairman, NHTSA
Secretary, TC
TNO/ EU/ EEVC/ WG12
INRETS/ EU/EEVC
JMOT/ JARI Japan
JARI/ Japan
WorldSID Chair
TC
Observer
Observer
Observer

1 AGENDA

- Adopted with addition of final item by Dominique Cesari

2 REVIEW OF MINUTES FOR 2001

- Minutes of June 7 were adopted with correction of attendees
- Minutes of November 17 were adopted with the following correction
Head drop test, if HIC is chosen as a criterion than we need to consider more than just peak ie; time period;

3 TERMS OF REFERENCE

3.1 Steering committee meeting in Washington in May 2002

3.2 Mission & objectives

- Coordinate worldwide biomechanical research efforts.
- Develop and document the technical basis for creating a world wide, harmonized, family of anthropometric test devices with associated injury criteria and performance limits.
- Provide biomechanical expertise to other IHRA groups.

3.3 Scope

The efforts of the Biomechanics Working Group shall entail but not be limited to efforts that:

- Analyze available worldwide crash data to quantify the type and severity of injuries resulting from each significant crash mode.
- Identify, analyze, and optimize meaningful injury functions that address the above-identified injuries.

- Review all available biomechanical impact response data to determine both necessary and sufficient specifications to appropriately characterize and verify a test device's biofidelity.
- Examine available tests devices with regard to their biofidelity and injury risk assessment capabilities and either recommend an existing device as appropriate or suggest and execute refinements necessary to upgrade performance to an acceptable level.
- Develop a strategic plan for future biomechanical research.

3.4 Action Plan

- Complete current side impact efforts and provide draft final report to IHRA Steering Committee by ?????.
- Initiate and pursue efforts to define and develop requirements for adult-sized world harmonized frontal anthropomorphic test devices. ???? with expected completion in 2 years.
- Initiate and pursue efforts to define and develop requirements for a world harmonized test device for rear impact injury evaluation and control. ???? with expected completion in 2 years.
- Review and prioritize future child dummy research efforts. ???? with expected completion in 2 years
Japan has as a first priority the adult male side impact dummy, then child frontal and side dummies are a priority.
- Develop a white paper discussing future biomechanical needs. (After completion of side and frontal crash efforts)

3.5 Meetings

- Conduct quarterly meetings a various venues to allow participating experts ample and open discussions to arrive at technical consensus

3.6 Deliverables

- Draft Final Report on Side Impact Test Dummy - ????
 - Draft Final Report on Frontal Test Dummy - December, 2003
 - Draft Final Report on Rear Impact Test Dummy - March, 2004

4 WORLD SID REPORT

Risa Scherer presented the WorldSID update and planned activities.

5 ANETTE IRWIN PRESENTED SCALING FACTORS UNDER DEVELOPMENT FOR CHILD DUMIES

6 ROLF EPPINGER PRESENTED THE THOR BIOMECHANICAL REQUIREMENT.

Jac Wismans: FID committee is reviewing the THOR requirements and will be meeting with WG12 to present the results of this analysis, there will be a report prepared of this review which will be presented to the group when available.

7 SIGNAL ALIGNMENT

Method for eliminating time 0 through minimalization, presented by Mat Maltese

8 DEVELOPMENT OF BIOFIDELITY CORRIDORS

3 options were proposed

- draw a line midway through the lower and upper boundary of the corridor
- create new corridors using cmv method (cadaver minimization method)
- Re-digitize the archived data and calculate mean response: Steve has offered to digitize a sub-sample of the data beginning April 1

9 UNRESOLVED ISSUES:

- Whether or not to include the more fragile cadavers for the development of biofidelity corridors
- Current cadaver sled testing by NHTSA, what data will be included in biofidelity corridor development
- Whether or not to accept the variance method for shifting the curves, dropping time.
- Whether or not to include previous pendulum, drop and other sled testing data
- Biofidelity ranking methodology including weighting criteria
- Defining Injury Criteria

March 7, 2002

10 REVIEW OF RECOMMENDED TEST

10.1 Head:

EEVC uses a single test derived from the Hodgson and Thomas data

ISO uses two tests

Proposal is for frontal, rear and side

Test 1 Rigid drop test (as conducted by EEVC)

Test 2 is out since it can not be completed

Test 3 & 4 Lateral pendulum test to the head, require further analysis, could possibly be replaced by EEVC already covered by Test 5 & 6

Test 5 & 6 Low speed pendulum impact requirements to the front Hodgson & Thomas, Prasad taken from the THOR requirements

Test 7 & 8 rear impact pendulum test to the head, require second look at fracture data, eliminate data points with fracture. Examine the effect of dropping fracture cases

Test 7 should be conducted at one speed, mid range of speeds for which data of non fracture points are available), Test 8 should be conducted at 3.2 m/s

Head CG requirements, belongs in the anthropometry section

- Members agree to retain Tests 1, 5 & 6.
 - Tests 3,4,7 & 8 require further analysis by **Mr. Maltese**, results will be communicated by E-mail to the committee members.
- Mr. Wismans stated that Test 3 & 4 required significant re-analysis, not deemed feasible by EEVC, suggests then that these tests should be dropped as well

Neck (3 tests all from 9790)

Test 1: 7.2G sled test EEVC document does not contain corridors, peak acceleration needs to be replaced by an acceleration time history.

Mr. Wismans will attempt to supplement existing data with corridor information and load data.

Test 2: 6.7 G sled test includes bending moments and forces at the head neck junction only one data point.

Test 3: based on one cadaver test

Mr. Wismans suggests that we retain test 1 and test 3, eliminate test 2 since it requires further analysis. Include this test as is.

- Members have agreed to retain test1 and test 3 and drop test 2.

One additional frontal neck test has been added by Mr. Maltese based on THOR requirements, performed on a mini-sled to evaluate anterior posterior response of the upper neck.

Test specification obtained from THOR requirements will be circulated to members for review.

EEVC is investigating the feasibility of including an oblique test based on NBDL volunteer data. Mr. Wisamns will advise members when these become available.

Sled test conducted at MCW 6.7 m/s, 8.9 m/s padded and unpadded conditions (flat, pelvic offset, abdominal offset, thoracic offset) approx. 60 plots.

Report structure: include individual body regions

Shoulder

Thorax



Full body tests

Shoulder

Test 1 impactor to the shoulder

Thorax

Test 1 lateral impactor test 4.3 & 6.7 m/s

Test 2 oblique impactor tests 4.3 & 6.7 m/s

Test 3 Heidleberg test, is dropped in favour of new NHTSA tests

Abdomen (EEVC)

Test 1 4.8 m/s oblique pendulum test

Test 2 6.8 m/s oblique pendulum test

Test 3 9.4 m/s oblique pendulum test

Pelvis (EEVC)

Test 1 3.4m/s lateral pendulum

Test 2 6.6 m/s lateral pendulum

- Mr. Wismans will obtain rational for inclusion of the force vs energy requirement into EEVC.

Femur

There is insufficient data at this time. Need to include a section in our report to identify this as a subject in need of further research.

SLED TESTS

Test 1 (included in EEVC in addition to Heidelberg test)

Wayne State sled test (from 9790) to complement MCW sled wall, includes shoulder load cell.

Heidelberg tests provides an additional shoulder test at a different speed (only force time history)

Advantages of including this test were discussed

Wayne offers: rigid @ 6.7 m/s, rigid @ 8.9m/s, 2 types of pelvic padding (15 & 23PSI) with a good complement of requirements; pelvic test is independent of thorax test due to different padding; corridor is force time history, T12 displacement, no acceleration requirement. Abdomen, force time response for all three tests

Heidelberg:

Thorax 6.7m/s rigid wall, 6.7 m/s & 10.3 (8.9) rigid and padded tests. Forces and acceleration are recorded. Padded tests cannot be repeated.

Thorax and shoulder: force time history. Peak pelvis force; Peak T1, T12, pelvic accelerations

Need to look at the best combination of Wayne State and Heidelberg tests.

Mr. Cesari will investigate the appropriate test/ requirements to include for shoulder specification

Normalized forces and deflections from NHTSA testing at VRTC and MCW for different test conditions were presented and discussed.

Mr. Maltese will re-calculate the curves according to the MoV.

Incorporate input from Mr. Cesari & Mr. Wismans (head acceleration in neck test 1)

June 17th June 18th 10 AM LYON

September pre-IRCOBI MUNICH

SAE Japan 23-25 July 2002, July 18-19 Yokohama Japan

September (IRCOBI 18-20)

Action plan final see attached.